 **UNIVERSITY OF MAINE AT FARMINGTON**

**COLLEGE OF EDUCATION, HEALTH AND REHABILITATION**

**LESSON PLAN FORMAT**

**Teacher’s Name:** Ms. Libby **Lesson #:** 6 **Facet:** Explanation  
**Grade Level:** 9th Grade **Numbers of Days:** 2 Days  
**Topic:** Linear Equations  
  
**PART I:**  
**Objectives**  
Students will understand the same solution techniques used to solve equations, can be used to rearrange formulas.  
Students will know inequalities, slope intercept form, and equations.  
Students will be able to demonstrate that the same solution techniques used to solve equations can be used to rearrange formulas.  
**Product:**Smart Board  
  
**Maine Learning Results (MLR) or Common Core State Standards (CCSS) Alignment**  
**Math Common Core State Standards**  
**Content Area:** Algebra  
**Grade:** High School  
**Domain:** Reasoning with Equations and Inequalities  
**Cluster:** Solve systems of equations  
**Standard:**  
6. Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables.  
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically  
**Rationale:**Students will meet standard six by creating equations using real world examples and solving them using graphic organizers to synthesis their data.  
  
**Assessments**  
**Formative (Assessment for Learning)**  
**Section I – checking for understanding during instruction**  
The teacher will go over the lesson using various teaching techniques. The teacher will then ask the students to do 3-2-1. This is where the students will raise the appropriate number of fingers in relation to their understanding of the lesson.  
**Section II – timely feedback for products (self, peer, teacher)**  
The students will do a self-assessment showing whether or not they think they understand the concept and how well they believe their smart board presentation went. The teacher will also give feedback on the students presentation using a rubric designed specifically for the smart board.  
  
  
**Summative (Assessment of Learning):**   
Smart Boards (50 points): Students must solve simple systems of linear inequalities graphically and algebraically and present the equation to the class using the smart board so the class can follow along. The smart board will allow the student to be interactive and solve the equation while the class is able to watch on a bigger screen. The student must show the steps and what formulas they use. They must create an X, Y table for the problem, a coordinate plane, and a plain worksheet to show their break down of the equation.

**Integration**  
**Technology:**  
Students will be using the smart board to present their understanding of how to solve linear equations to the class. This will let show their steps to solve the equations while the class is watching on a bigger screen. This will make sure that the student understands the concept and can also get student feedback while they are working through the problem on the smart board.  
**Content Areas:**  
**English:** Students will have to explain their steps for solving the linear equations to the class in a way that everyone can understand.  
**Art:** Students will have to graph their linear equation using the appropriate lines and create a data table.  
  
**Groupings**  
**Section I - Graphic Organizer & Cooperative Learning used during instruction**  
Students will use the KWS Chart, which stands for Know, Want, and Sources. They will use this chart to format their thinking into three easy categories. Students will do team pair solo which will allow them to work in teams, then with a partner, and then alone. This helps the students that do not fully understand the concept, work and collaborate with a team, then more personally with a partner. Once they have understood the concept, they will work alone to complete the rest of the worksheet.  
**Section II – Groups and Roles for Product**  
Students will be working alone when first completing the product because they will present the product to the class. They will get to collaborate in teams and partners to go over further discussion on solving linear equations.  
  
**Differentiated Instruction**  
**MI Strategies**  
**Verbal:** Students will be verbally presenting their equation to the class and work through the problems.  
**Logic:** As students work through the KWS chart, they will be writing down their thinking and working through it logically.  
**Visual:** The KWS chart will be a visual reminder of what the students need to be thinking about when working through the problem. Having hoop shoot as well up on the big screen will help the students remember what they did to complete different equations.  
**Intrapersonal:** While the students are doing team-pair-solo, they will have a chance to work on the problems individually.  
**Interpersonal:** While the students are doing team-pair-solo, they will have many chances to work with other people in both a group and in partners.  
**Naturalist:** Before the students fill out their KWS chart, there will be projections and equations about the global warming issue. Students will have to plug in numbers and dates and come up with an equation to be able to determine what the climate will be like in a certain amount of time in terms of global warming.  
  
**Modifications/Accommodations**  
***From IEP’s ( Individual Education Plan), 504’s, ELLIDEP (English Language Learning Instructional Delivery Education Plan)****I will review student’s IEP, 504 or ELLIDEP and make appropriate modifications and accommodations.*  
  
**Plan for accommodating absent students:**  
Students that are absent will still be expected to present an equation to the class using the smart board. If they miss the day of presentations as well, then they are expected to present when they return to class. If the student knows that they will miss the day of presentations, then they also have the option before they leave. Students will have a Skype buddy that was assigned at the beginning of the year and they will Skype into class if a computer is available to them. That way they are receiving the same instruction as their students and they are still part of the class. Students that miss the lesson will have an absent folder with all the worksheets that they missed. Students will meet with the teacher after school and during office hours to go over the graphic organizer and to get instruction on the smart board product.  
  
**Extensions**  
**Type II technology:**  
Students will be using the smart board to solve and graph linear equations. They will have to show and explain all the steps that they took while the class follows along. The class will be able to see the process on a bigger screen and physically see each step that is being taken in order to solve and graph the equation. They will have to think critically on the formula they use to solve the equation and graph it.  
  
**Gifted Students:**  
Gifted students will still be required to present their equation to the class but they will have to create their own linear equation and get it approved by me. They will present their equation to the class, explain why they chose to create their specific one and then present on how to solve and graph the equation using the smart board.  
  
**Materials, Resources and Technology**  
Smart Board  
Laptops  
Graphing Paper  
Calculators  
White Board  
White Board Markers  
  
**Source for Lesson Plan and Research**  
**Hoop Shoot/ Basketball Games:**  
<http://www.math-play.com/math-basketball.html> - This where the basketball hook game is located.  
**KWS Chart:**  
<http://www.eduplace.com/graphicorganizer/pdf/kws.pdf> - This is where the graphic organizer for this lesson is located.  
**Cooperative Learning:**  
<http://edu221resources.wikispaces.com/file/view/cooperative_learning_strategies.pdf/426402320/cooperative_learning_strategies.pdf>- This is where many cooperative learning strategies are located.  
**Checking For Understanding:**  
<http://edu221spring11class.wikispaces.com/file/view/strategies.pdf/200849872/strategies.pdf> - This is where many checking for understanding strategies are located and the one specific to this lesson.  
  
**PART II:**  
**Teaching and Learning Sequence (Describe the teaching and learning process using all of the information from part I of the lesson plan)***Take all the components and synthesize into a script of what you are doing as the teacher and what the learners are doing throughout the lesson. Need to use all the WHERETO’s. (3-5 pages)*  
  
*Classroom Arrangement: Desks will be in groups of four facing towards each other.*  
  
**Agenda:**  
*Day One (80 minutes):*

* Hook (5 - 10 minutes)
* Class discussion on graphic organizers (15 minutes)
  + Students will fill out the first two columns on the KWS chart.
* Go over final product (10 minutes)
  + Go over product rubric
* Team-Pair-Solo (30 minutes)
  + Students will work in teams of four to answer real world problems that are posted on the white board (10 minutes)
    - Students are encouraged to rearrange equations
  + Students will then work in pairs to answer real world problems that are posted on the white board (10 minutes)
    - Students are encouraged to solve equations
  + Students will than work alone to answer and solve real world problems that are posted on the board (10 minutes)
    - Some problems will require students to graph equations
* 3-2-1 (5 minutes)
  + Students will communicate their level of understanding by showing using their fingers
    - 3 fingers means that they fully understand the concept
    - 2 fingers means that students semi understand the concept but are confused on certain aspects
    - 1 finger means that students do not understand the concept
* Work on product (10 minutes)
  + Each student is given a different real world problem that they must present to the class using the smart board
  + Students that raised 1 finger for their level of understanding will work with the teacher one-on-one until they have a better level of understanding.

*Task:* Finish graphing problem and prepare for presentation

*Day Two (80 minutes):*

* Go over presentation order (5 minutes)
* Students present (5 - 7 minutes each)
* Students fill out last column on the graphic organizer (KWS chart) (5 minutes)
* Go over final unit performance task (10 minutes)
  + Short overview on what they must do for their final performance task
  + Students can have access to web quest if they want to read ahead
  + Tomorrow go over performance task in detail

Students will understand the same solution techniques used to solve equations, can be used to rearrange formulas. Students that play any type of sport will need to approximate the angle that they need to shoot the ball in order to get the goal. For example, in basketball you have to estimate where you’re shooting your ball and what spot on the backboard will result in a basket. *Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables.*After students enter the classroom they will play the basketball hoop shoot game. There are many types of the game for the different aspects of solving equations. Students will get to choose which game they play and they have the choice to play in groups, partners, or alone.   
**Where, Why, What, Hook Tailors:***Interpersonal, Intrapersonal, Musical, Logical, Visual*  
  
Students will know inequalities, slope intercept form, and equations. **(See Content Notes)** Students will use the KWS Chart, which stands for Know, Want, and Sources. They will use this chart to format their thinking into three easy categories. Students will be encouraged to fill out the first two columns of the chart alone. This asks the students to reflect on where they stand in their learning by asking what they know and what they want to know. Students will fill out the third column on the last day of the lesson. Students will do team pair solo which will allow them to work in teams, then with a partner, and then alone. When the students are in teams they will collaborate in order to answer a real problem. The students will then work in partners to answer more real world problems. When the students are alone they will answer a real world problem. This helps the students that do not fully understand the concept, work and collaborate with a team, then more personally with a partner. Once they have understood the concept, they will work alone to complete the rest of the worksheet. Students will then show their level of understanding using the 3-2-1 strategy. Students that feel that they fully understand the concept will raise three fingers. Students that feel that they have a semi understanding of the concept except are still confused on a few aspects will raise two fingers. Students that feel that they are still confused on the whole concept and do not understand will raise one finger. This will let me know where my students are in terms of their understanding on the lesson and the unit as a whole.   
**Equip, Explore, Rethink, Tailors:***Intrapersonal, Interpersonal, Kinesthetic, Logical, Visual, Verbal.*  
  
Students will be able to demonstrate that the same solution techniques used to solve equations can be used to rearrange formulas. Students will use the KWS Chart, which stands for Know, Want, and Sources. They will use this chart to format their thinking into three easy categories. This will help the students physically see where they are in terms of understanding the content being taught. They will fill out the first two columns at the beginning of the lesson. After the lesson is taught and the presentations are done, students will use that new information to fill out the third column. Through team-pair-solo students will be able to collaborate with their peers to further their understanding before they must work alone to solve problems. This will help students that do not fully understand the concept to get help from their team and partners before they must work alone to demonstrate their knowledge. Students will be working towards using the smart board to present their own equation to the class and go over step by step how to solve it. Students will be given a problem that they must solve for and show their solution techniques to the class. They must graph their equation in front of the class and explain each step that they take. This will help the students see the same solution techniques used in different scenarios and situations. It will also help the students fully understand how they solved for the equations by having to verbally explain the steps they took to their fellow classmates.   
I will go over the lesson using various teaching techniques. I will then ask the students to do 3-2-1. This is where the students will raise the appropriate number of fingers in relation to their understanding of the lesson. The students will do a self-assessment showing whether or not they think they understand the concept and how well they believe their smart board presentation went.   
**Explore, Experience, Revise, Refine, Tailors:***Intrapersonal, Interpersonal, Visual, Logical, Verbal*  
  
The students will do a self-assessment showing whether or not they think they understand the concept and how well they believe their smart board presentation went. This way they have to think critically on how well they think they understand the concept. Students are not asked to self-evaluate just how they presented the information but on the information itself. I will also give feedback on the students presentation using a rubric designed specifically for the smart board.  
**Evaluate, Tailors:***Interpersonal, Logical, Visual.*  
  
  
**Content Notes**  
Students will know…..  
*Vocabulary Definitions:*

* Inequalities
* Equation
* Slope-intercept Form

Inequality:  
An inequality is a mathematical sentence that compares two quantities that do not equal each other. There are a two main ways to compare quantities:  
> (Greater than)  
< (Less than)  
An example of this is 2 + 3 < 97 – 82 This is saying that 2 + 3 is less than 97 - 82  
To check that this is true, you solve both sides separately which will make this 5 < 15 which saying that 5 is less than 15 which is correct  
Equation:  
An equation is a mathematical sentence that indicates that two number or mathematical expressions are equal. An example of this is 3x - 4 = 19. The equal sign shows that the expression on the left side (3x- - 4) of the equation is equal to the ride side (19) of the equation.  
Slope – Intercept Form:  
The slope - intercept form of a linear equation is given by the following formula: y= mx + b ;(where ‘m’ is the slope and ‘b’ is the y – intercept)  
Slope is a ratio use to measure the steepness of a line. To find slope you must find the change in ‘y’ over the change in ‘x’. This can also be written as: Rise/Run  
The way to find rise/run is to have to points on a line. For example (1,2) and (3,4); to find the ‘rise’ you find the difference between the y coordinates. So; 4 – 2 = 2 then you do the same thing for the x coordinates to find the ‘run’. So; 3 -1 = 2 this will make the final answer be 2/2 which is 1 so the slope is 1.  
  
**Handouts**  
KWS Chart  
Graphing Paper  
  
**Maine Common Core Teaching Standards for Initial Teacher Certification and Rationale**  
*Standard 1 – Learner Development. The teacher understands how learners grow and develop, recognizing that patterns of learning and development vary individually within and across the cognitive, linguistic, social, emotional, and physical areas, and designs and implements developmentally appropriate and challenging learning experiences.*  
  
  
***Learning Styles***  
***Clipboard:*** The class expectations are clearly stated on the class wiki as well as most of the rubrics needed for this whole unit. It covers everything that is expected and nothing is left to interpretation unless otherwise discussed with me.   
***Microscope:*** There will be graphic organizers for every part of the unit so students will be able to write down their learning process. There will be checking for understanding throughout the lesson so students will always know if they understand the concept and to what extent. Class collaboration will allow the students to work together and constantly think deeper into the subject.  
***Puppy:*** Students will be seated in groups of four facing inwards so that they have a constant supposed system around them. These way students can help and collaborate with each other. Classroom expectations will be posted inside the classroom to create a helping and respectful environment for everyone.  
***Beach Ball:*** Students will be filling out the KWS chart individually and get to explain how they are grasping the concept in way that best suits them. Students will also get to use the smart board to present their equation. They must graph the equation but have the freedom to explain their steps in a way that they like the best.  
***Rationale:***This lesson meets the standard because I know different strategies to appeal to all kinds of learning styles. Students will have multiple opportunities to prove their understanding to further their knowledge in the unit.  
  
  
*Standard 6 -* *Assessment. The teacher understands and uses multiple methods of assessment to engage learners in their on growth, to monitor learner progress, and to guide the teacher's and learner's decision making.*  
  
***Formative:***  
**Section I – checking for understanding during instruction**  
The teacher will go over the lesson using various teaching techniques. The teacher will then ask the students to do 3-2-1. This is where the students will raise the appropriate number of fingers in relation to their understanding of the lesson.  
**Section II – timely feedback for products (self, peer, teacher)**  
The students will do a self-assessment showing whether or not they think they understand the concept and how well they believe their smart board presentation went. The teacher will also give feedback on the students presentation using a rubric designed specifically for the smart board.  
  
***Summative:***  
Smart Boards (50 points): Students must solve simple systems of linear inequalities graphically and algebraically and present the equation to the class using the smart board so the class and follow along. The smart board will allow the student to be interactive and solve the equation while the class is able to watch on a bigger screen. The student must show the steps and what formulas they use. They must create an X, Y table for the problem, a coordinate plane, and a plain worksheet to show their break down of the equation.  
  
***Rationale:***  
This will let me know where the students are in terms of mastery and understanding of the content being taught. I will use this information in planning future lessons and to strengthen my teaching style and technique so that all students benefit from my lessons. Formative assessments will be used multiple times in my lessons so that I will constantly have an idea of where my students are in their learning.  
  
*Standard 7* - *Planning Instruction. The teacher plans instruction that supports every student in meeting rigorous learning goals by drawing upon knowledge of content areas, curriculum, cross-disciplinary skills, and pedagogy, as well as knowledge of learners and the community context.*  
  
***Content Knowledge:***  
Students will know inequalities, slope-intercept form, and equations.  
  
***MLR or CCSS:***  
**Math Common Core State Standards**  
**Content Area:** Algebra  
**Grade:** High School  
**Domain:** Reasoning with Equations and Inequalities  
**Cluster:** Solve systems of equations  
**Standard:**  
6. Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables.  
7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically  
***Facet:*** Explanation  
***Rationale:***Students will meet standard six by creating equations using real world examples and solving them using graphic organizers to synthesis their data.  
  
*Standard 8 -* *Instructional Strategies. The teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections, and to build skills to apply knowledge in meaningful ways.*  
  
***MI Strategies:***  
**Verbal:** Students will be verbally presenting their equation to the class and work through the problems.  
**Logic:** As students work through the KWS chart, they will be writing down their thinking and working through it logically.  
**Visual:** The KWS chart will be a visual reminder of what the students need to be thinking about when working through the problem. Having hoop shoot as well up on the big screen will help the students remember what they did to complete different equations.  
**Intrapersonal:** While the students are doing team-pair-solo, they will have a chance to work on the problems individually.  
**Interpersonal:** While the students are doing team-pair-solo, they will have many chances to work with other people in both a group and in partners.  
**Naturalist:** Before the students fill out their KWS chart, there will be projections and equations about the global warming issue. Students will have to plug in numbers and dates and come up with an equation to be able to determine what the climate will be in a certain amount of time in terms of global warming.  
  
***Type II Technology:***  
Students will be using the smart board to solve and graph linear equations. They will have to show and explain all the steps that they took while the class follows along. The class will be able to see the process on a bigger screen and physically see each step that is being taken in order to solve and graph the equation. They will have to think critically on the formula they use to solve the equation and graph it.  
***Rationale:***  
This lesson incorporates multiple intelligences to ensure that each student is getting the most out of my unit. This helps so that the students all have an equal opportunity to learn the way they learn best. It ensures that every student is included and engaged in the lesson being taught. I want all students to understand their learning style better so that later on in other classes, they can take this knowledge with them to further their learning.  
  
***NETS STANDARDS FOR TEACHERS***  
**1. Facilitates and Inspire Student Learning and Creativity. Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.**  
a. Promote, support, and model creative and innovative thinking and inventiveness

b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources

c. Promote student reflection using collaborative tools to reveal and clarify students’ conceptual understanding and thinking, planning, and creative processes

d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments

***Rationale:***  
Students will have to think critically in order to create their final product. They will also have to think critically about where they are in terms of their understanding of the concept when filling out the KWS chart. They will get to see their progress when they complete the first two columns of the chart before the lesson and filling out the third column after the lesson  
  
**2. Design and Develop Digital Age Learning Experiences and Assessments. Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop knowledge, skills, and attitudes identified in the NETS-S.**  
a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity

b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress.

c. Customize and personalize learning activities to address students’ diverse learning styles, working strategies, and abilities using digital tools and resources

d. Provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching

***Rationale:***  
Students will be using the smart board to convey to the class how to solve and rearrange their equation. They will have to graph the equation in front of the class and explain each step that they take. That way their fellow classmates get to see other examples of solving equations and the student better understand by verbally expressing their solution techniques. Through formative and summative assessments, students will have multiple opportunities to prove whether they understand the content, to what extent, and what they need help on understanding. Students will each have the opportunity to learn according to their learning style and their multiple intelligences.

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